

THE COCCID GENUS EULECANIUM.

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Some years ago I attempted to make tables to separate the species of *Eulecanium*. The attempt was not wholly successful; partly on account of the difficulty of the subject, and partly because there are no doubt more names than species in this genus, and the first step should probably be to reduce a number to the synonymy. Certain characters of undoubted value could not be used because they were not known for many species; for example, the characters derived from the males and the larvæ. The minute characters described by Mr. Thro, of Cornell University, are in the same case; but their value is rather uncertain for closely-allied forms. The forms separated by Mr. Thro were nearly all widely separated otherwise—in fact, of different genera as we now understand them—and hence it remains to apply his test to a more difficult and closely-allied series.

The tables are presented herewith, not because they are perfectly safe guides to the identity of the species, but rather because of their value as indicating groupings, and suggesting the lines of future work. They will at any rate save some trouble in going through descriptions. When a name occurs twice, the species is variable.

(1.) Long. 10–11 $\frac{1}{2}$, lat. 6–9 $\frac{1}{2}$ mm.

(a) Larger as a rule, dark red-brown, with white powder; antennæ 7-jointed *carya*.

(b) Not over 10 mm. long; brown, sometimes varied with yellow; antennæ 6-jointed *aceris*.

(2.) Long. 8–9 mm.

(a) Convex; antennæ 6-jointed.

(i) Legs rather slender *pyri*.

(ii) Legs short and robust; scale reddish-brown, sometimes mottled with yellow (*pyri* is darker and not mottled).

(b) Tibia equal to tarsus, fide Signoret *aceris*.

(bb) Tibia longer *capræ*.

(*aceris* and *capræ* are no doubt one species.)

The distinction of *pyri* and *aceris* is further confirmed by the males:

(i) ♂ yellow, with wide brownish thoracic band *pyri*.

(ii) ♂ light reddish-brown, with darker band on thorax; abdomen, antennæ and legs yellowish *aceris*.

- (aa) Less convex; antennæ 7- or 8-jointed.
- (i) Scale with two prominent tubercles; antennæ 8-jointed *Cockerelli*.
- (ii) Scale without such tubercles.
- (b) Antennæ 7-jointed; scale alt. $2\frac{1}{2}$ -3 mm . . . *mori*.
- (bb) Antennæ 8-jointed.
- (c) Joints 3, 4, 5 nearly equal *genistæ*.
- (cc) Joint 3 longer than 4, and this longer than 5.
- (d) 5, 6, 7 nearly equal; scale narrower, 3 mm. wide; second antennal joint with one hair only, this very long *elongatum*.
- (dd) 6 longer than 7, and may be longer than 5; scale broader, $4\frac{1}{2}$ mm. wide; second antennal joint with two long hairs . . . *magnoliarum*.
- (3.) Long. 7 mm.
- (a) Convex, alt. usually 5 or 6 mm.
- (i) Antennæ 8-jointed; legs short and robust, tarsus longer than tibia *Douglasi*.
- (ii) Antennæ 7-jointed; tarsus shorter than tibia.
- (b) Legs long and slender *coryli*.
- (bb) Legs robust; scale higher, alt. 5 mm *ulmi*.
- (iii) Antennæ 6-jointed; legs robust, tarsus shorter than tibia; scale highest of this group; alt. 6 mm *capree*.
(*ulmi* and *capree* are probably one species.)
- (aa) Less convex, alt. not over 4 mm., usually less.
- (i) Antennæ 8-jointed.
- (b) Not pruinose; legs ordinary *rosarum*.
- (bb) Pruinose; anterior legs with tarsi very broad *berberidis*.
- (ii) Antennæ 7 jointed, joints 3 and 4 about equal; legs ordinary
- (b) Pruinose with a whitish powder *pruinsum*.
- (bb) Not pruinose.
- (c) More convex, 4 mm. high *quercifex*.
- (cc) Less convex, not over 3 mm. high. . . *mori*.

- (4.) Long. 6-6½ mm.
- (a) Convex, alt. 4 to 6 mm.
- (i) Antennæ 6-jointed.
- (b) Legs slender; ♂ abdomen as wide as thorax *tiliæ*.
- (bb) Legs robust; tibia longer than tarsus.
- (c) Scale finely punctured; alt. 6 mm., the highest of this group *caprææ*.
- (cc) Scale strongly punctured on the sides; alt. 4 mm.; ♂ abdomen hardly half as wide as thorax *æsculi*.
- (ii) Antennæ 7 jointed; scale not pruinose; legs ordinary.
- (b) Scale hemispherical; legs rather slender . . . *robinie*.
- (bb) Scale with the anterior part very convex, the posterior depressed *takachihoi*.
- (aa) Less convex, alt. 3 mm. or less.
- (i) Antennæ 8-jointed; European.
- (b) Anterior legs with very broad tarsi . . . *berberidis*.
- (bb) Legs ordinary *rosarum*.
- (ii) Antennæ 7-jointed; Canadian.
- (b) Third joint very long; scale alt. 2²/₃ mm. *caryarum*.
- (bb) Third joint not especially long; scale alt. 2 mm *fraxini*.
- (iii) Antennæ 6-jointed; France *ciliatum*, var.
- (5.) Long. 5-5½ mm.
- (a) Flattened form.
- (i) Antennæ 6-jointed *Kansasense* (alt. 2 mm.) and [*Folsomi* (alt. 1½ mm.).
- (ii) Antennæ 7-jointed . . . *Lintneri*, *assimile* and *aurantiacum*.
- (iii) Antennæ 8-jointed *hortensie*, *berberidis* and *persicæ*.
- (aa) Less flat, alt. 2 to 3 mm *Guignardi*, *ciliatum* and [*distinguendum*.
- (aaa) Convex to subglobular. *Hoferi*, *antennatum*, *quercitronis*, [*bituberculatum*, *caryarum*, *corni*, *cynosbati*, *pyri*, [*robinie*, *robiniarum*, *rubi*, *rugosum*, *Canadense*.

(6.) Long. 4-4 + mm.

(a) Very convex *quercitronis*, *gibber*, *prunastri*, *robiniae*, *Canadense*, *variegatum*, *perornatum*.

(aa) Less convex *Guignardi*, *roseae*, *Marchali*, *maclurarum*,
[*cerasi*, *robiniarum*, *rugosum*, *tarsale*.

(aaa) Flattish *Lustneri*, *Lymani*, *rufulum*, *assimile*, *aurantiacum*, *Kansasense*, *armeniaceum*, *Folsomii*.

(7.) Long. 3-3 + mm.

(a) Convex *quercitronis*, *prunastri*.

(aa) Less convex *rufulum*, *pallidior*, *aurantiacum*, *Kansasense*.
[*Lymani*.

(aaa) Flattened *wistaricae*.

(8.) Long. 2-2 + mm. *prunastri*, *Fletcheri*.

The following supplementary tables are based on the antennæ; the measurements are all in μ :

Antennæ 6-jointed 1.

Antennæ 7-jointed 7.

Antennæ 8-jointed 18.

1. Joints 3 and 4 equal, 6 as long or nearly so *Lustneri*, King (cf.
[*Reh.*, *Zeit. f. Ent.*, 1903, p. 409).

Joint 3 always longest, and *very* much longer than 2, 4 or 5 2.

2. Joint 6 long, not very much shorter than 3 *rufulum* and *pallidior*.

Joint 6 very much shorter than 3 3.

3. 2 shorter than 4 or 5, 6 not much shorter than 5 *Hoferi* (King).

2 about equal to 4 or 5 (compare also *corni*) 4.

2 longer than 4 or 5 5.

4. 6 shorter than 4, which is longer than 2 or 5 *quercifex* var. (Mass.).

6 much longer than 4 or 5, which are equal *Websteri*, var. on
[*Cytisus*, from Hamburg (fide King).

6 longer than 4 or 5, 5 longer than 4 some Kansas *armeniaceum*.

5. Joint 5 obviously longer than 4 *Lymani* (on oak), *Canadense* (on
[elm), *prunastri* and *armeniaceum*.

4 and 5 equal or almost so *tarsale* (Mass., on *Cornus*),

[*roseae* (on rose), sp. (Germany, on *Prunus*), *Folsomii*
[(on pawpaw), *capreae* (of Douglas), *nigrofasciatum*.

5 shorter than 4 6.

6. Scale with a broad central boss *ciliatum* (France), *Kansasense* [(Kansas).
 (The legs are larger in *ciliatum* than in *Kansasense*.)
 Scale without such a boss *Websteri* (Ohio), *Kingii*.
7. Joint 3 longest, very long, *much* longer than 4 8.
 3 longest, but not very long, a little longer than 7; 6 shortest, 4 shorter than 2 *rosarum* of King and Reh.
 1 longest, 2 and 3 nearly as long, or 3 shorter; 4 conspicuously shorter than 3; 5 a little longer than 4 or 6 *perornatum*
 4 conspicuously the longest; 5 shorter than 3 14.
 4 longer than 3, but not greatly so, or equal with 3 15.
 3 longer than 4, but not greatly so, or equal with 4 17.
8. Joint 4 much longer than 5; 5 and 6 shortest and equal *Canadense* (Maine, on elm), *caryæ* (cf. King).
 4, 5, 6 short and equal or subequal (of *capreæ* and *ciliatum*) 9.
9. Joint 7 short, about as long as 4 or 5; 6 a little shorter than 5 or 7 *Marchali*.
 7 plainly longer than 4, 5 or 6 10.
10. 6 shorter than 5 (of *antennatum*) 11.
 5 and 6 equal, or 6 a trifle longest 12.
11. 3 over 85 μ *rufulum*.
 3 under 75 μ supposed *robiniae* from Phoenix, Ariz., on [osage orange.
12. 3 about 80 μ supposed *robiniae* from Phoenix, Ariz., on *Schinus* [*molle*; sp. incert. from Springfield, Mass., on *Quercus* (cf. King.)
 3 90 to 110 μ 13.
13. Joint 2 30 to 35 μ *maclurarum*.
 Joint 2 40 to 50 μ *caryarum*.
14. 5 and 6 equal *bituberculatum* from Stuttgart (cf. King).
 5 longer than 6 *bituberculatum* from Oregon.
 6 longer than 5 *prunastri*.
15. 2 longer than 3, 7 as long as 4 *robiniarum* (original figure).
 2 shorter than 3 16.
16. European *assimile*, *variegatum*, *Rehi*.
 American *tarsale* (Mass.), *kermoides* (Les Vegas Hot Springs, [N. M.), sp. on rose from Ohio, *Guignardi*, [*Fitchii*, *armeniicum* (California).

17. Joint 5 longer than 6 *cynosbati*, *rosæ*, *aurantiacum*, *quercifex*,
[*fraxini*.
5 and 6 equal, or 6 longer. *armeniacum* (Calif. and Kans.), *coryli*
[of King and Reh, *Lymani*, *persicæ?* (Canada, under
[glass, and from Dr. Reh, cf. King, *pruinatum*,
[*quercitronis* (Ariz. and Calif.), *vini* of King and
[Reh, *robinia?* (Tempe, Ariz., on osage-orange),
[*quercifex* (of Signoret), *takachihoi* (Japan), *Cana-*
[*dense* (Maine, on elm), sp. on tulip tree, R. I.
18. Joint 3 conspicuously longest, 5 conspicuously shorter than 4 or 6,
7 shortest of all; 8, 5 and 2 about the same length . . . *magnoliarum*.
3 longest, but not long, 5 and 8 about equal, and not much shorter
than 3. 4 conspicuously shorter than 3 or 5 *prunastri* (France).
3 and 4 subequal, or sometimes 3, sometimes 4, a little the longer . . . 19.
4 longest, much longer than 3, 3 and 5 about equal *hortensia*.
3 longest, and rather long, 4 conspicuously longer than 5; 5 being
conspicuously shorter than 4, but a little longer than 6 20.
3 longest, 4 and 5 equal or subequal 21.
19. 5, 6 and 7 shortest, and equal or
almost *subsimile* (Chihuahua) and *berberidis*.
6 and 7 shortest and equal, but 5 conspicuously longer . . . *hortensia*.
20. 8 short, shorter than 4, 7 a little shorter than 6 *quercifex*.
8 longer, longer than 4, 7 a little longer
than 6 *persicæ?* (Canada, on peach under glass, cf. King).
21. 3 very long, much longer than any other joint 22.
3 not very long, usually quite short; 4 shorter
than 5 *Cockerelli*, *rosarum* of King and Reh, *Marchali*.
22. Joints 4, 5, 6, about equal *rufulum*.
5 longer than 4 or 6 *Cockerelli*.

The occurrence of the same species in several different places in the above table shows the great variability of the antennæ of these insects; yet I do not believe for a moment that this variability is indiscriminate, or that the antennæ are useless for purposes of identification. They must, however, be used cautiously in this genus, and in conjunction with other characters.

I do not expect to pay much more attention to this genus myself; for Mr. J. A. Sanders, with much better opportunities than I possess, is about to beg'n an investigation of it; and he will undoubtedly make many things clear which have been obscure.